

where A is expressed to 10^{-7} . The corresponding term in $\frac{dv}{dt}$ is $-A \times 0.091297 \cdot \cos [D - 2f + l]$, which is nearly $= \frac{-A}{10} \cdot \cos [D - 2f + l]$; and, if we do not express the new coefficient $\frac{-A}{10}$ to 10^{-8} , we lose a part of the valid result of the application of this term, upon which the valid conclusion as to the correction of the coefficient A (by the process of Symbolical Variations) will hereafter depend. Therefore, the whole process for forming the term in $\left(\frac{r}{a} \cos [I]\right)^2 \times \frac{dv}{dt}$ must be so conducted that the term whose argument is $D - 2f + l$ shall be correct to 10^{-8} . And subsequently, when we form $\frac{d}{dt} \left\{ \left(\frac{r}{a} \cos [I]\right)^2 \times \frac{dv}{dt} \right\}$, the coefficient will again be multiplied by -0.0912971 ; and the product, to secure its legitimate validity, must be worked out correctly to 10^{-9} . In like manner, for the term $B \cdot \sin [f - v]$, the first operation must be carried to 10^{-9} and the second to 10^{-11} .

For the arguments whose movements are nearly ± 1 the reasoning is somewhat different; but it leads to a conclusion almost similar, namely, that the extension of decimal places in the result must depend (in a similar manner) on the difference between the argument and the number ± 1 . The small factor, however, is not here repeated.

1876, January 19.

Observations of Occultations of Stars by the Moon, and of Phenomena of Jupiter's Satellites, made at the Royal Observatory, Greenwich, in the year 1875.

(Communicated by the Astronomer Royal.)

Occultations of Stars by the Moon.

Day of Obs.	Phenomenon.	Telescope.*	Power.	Moon's Limb.	Mean Solar Time of Observation. h m s	Observer.
1875.						
May 12	Disapp. of 37 Leonis	E. Eq.	140	Dark	11 7 31.9	L
Oct. 16	„ ζ Arietis	Altaz.	100	Bright	9 20 16.6	J
„	Reapp. of ζ Arietis	E. Eq.	140	Dark	10 14 37.4	C
Nov. 21	Disapp. of β Virginis	Altaz.	100	Bright	14 49 20.8	L
„	Reapp. of β Virginis	„	„	Dark	15 54 30.2	L

* The clear aperture of the object-glass of the S.E. Equatoreal is $12\frac{3}{4}$ inches, of the East Equatoreal 6.7 inches, of the North Equatoreal 4.1 inches, and of the Altazimuth $3\frac{3}{4}$ inches.

Phenomena of Jupiter's Satellites.

Day of Obs.	Satellite.	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation.			Mean Solar Time from N.A.			Observer	
					h	m	s	h	m	s		
1875.												
Jan.	4	III	Tr. eg. bisection	S.E. Eq.	220	12	27	56	12	38	WC	
		III	„ last cont.	„	„	12	34	55			WC	
		III (a)	„ last cont.	E. Eq.	140	12	38	5			AD	
pr.	5	I	Tr. ing. first cont.	S.E. Eq.	310	10	15	9	10	21	M	
		I	„ bisection	„	„	10	17	8			M	
		I	„ last cont.	„	„	10	18	53			M	
		I	Tr. eg. first cont.	„	„	12	23	17	12	32	M	
		I	„ bisection	„	„	12	25	47			M	
		I	„ last cont.	„	„	12	28	7			M	
		III (b)	Ecl. disapp.	„	„	13	8	0.1	13	6	27.5	M
13		I (c)	Ecl. disapp.	„	130	9	19	3.3	9	19	11.6	M
		I	Occ. reapp. first cont.	„	310	11	31	34	11	34	M	
		I	„ last cont.	„	„	11	33	1			M	
		I	„ first cont. E. Eq.	140	11	31	55	AD				
		I	„ last cont.	„	„	11	34	19	11	34	AD	
16		III (d)	Tr. eg. bisection	S.E. Eq.	220	8	40	41	8	50	WC	
		III	„ last cont.	„	„	8	50	9			WC	
18		II (e)	Occ. disapp. first cont.	„	310	11	24	55	11	26	WC	
		II	„ bisection	„	„	11	26	44			WC	
		II	„ last cont.	„	„	11	28	44			WC	
		II	„ first cont. E. Eq.	70	11	20	1	11	26	T		
		II	„ bisection.	„	„	11	23			1	T	
		II	„ last cont.	„	„	11	26			30	T	
20		II	Tr. eg. first cont.	N. Eq.	...	8	38	20	8	43	C	
		II	„ last cont.	„	...	8	40	50			C	
		I	Occ. disap. first cont.	„	...	11	4	56	11	6	C	
		I	„ bisection	„	...	11	6	41			C	
		I	„ last cont.	„	...	11	8	26			C	
		I	Ecl. reapp.	Altaz.	100	13	23	46.4	13	20	53.9	C
23		III	Tr. eg. first cont.	S.E. Eq.	130	11	57	59	12	9	M	
		III	„ bisection	„	„	12	1	49			M	
		III	„ last cont.	„	„	12	12	27			M	
29		I (f)	Ecl. reapp.	„	220	9	42	56.5	9	43	12.7	WC
		I	„	E. Eq.	140	9	43	19.2			AD	
May	4	II	Tr. ing. bisection	„	„	13	13	16	13	10	T	
		II	„ last cont.	„	„	13	16	16			T	

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Day of Obs.	Satellite.	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation. h m s	Mean Solar Time from N.A. h m s	Observer
1875.							
May 6	II (g)	Ecl. reapp.	S.E. Eq.	220	8 24 56.8		M
"	II	"	E.Eq.	140	8 25 47.6	8 27 31.3	A D
"	I	Occ. disap. first cont.	"	"	8 56 33	9 0	A D
"	I	" bisection	"	"	8 58 42		
"	I	" last cont.	"	"	9 0 17		
"	I (h)	" first cont.	S.E. Eq.	220	8 58 3	9 0	M
"	I	" bisection	"	"	9 0 11		
"	I	" last cont.	"	"	9 1 56		
11	III (i)	Ecl. disap.	E. Eq.	140	9 2 11.2	8 58 27.6	C
13	I	Occ. disap. first cont.	"	"	10 43 30	10 45	T
"	I	" bisection	"	"	10 44 30		
"	I	" last cont.	"	"	10 45 30		
"	II	Ecl. reapp.	"	"	11 3 26.7	11 4 16.9	T
18	III (k)	Occ. disap. first cont.	S.E. Eq.	310	9 54 33	10 1	W C
"	III	" bisection	"	"	9 59 2		
"	III	" last cont.	"	"	10 9 50		
"	III	" first cont.	E. Eq.	"	9 59 55	10 1	C
"	III	" last cont.	"	"	10 9 24		
"	III (l)	Occ. reapp. first cont.	S.E. Eq.	"	12 4 19	12 9	W C
"	III	" bisection	"	"	12 9 48		
"	III	" last cont.	"	"	12 11 48		
"	III (m)	" first cont.	E. Eq.	"	12 6 4	12 9	C
"	III	" last cont.	"	"	12 13 3		
21	I	Tr. eg. first cont.	"	"	11 52 43	11 54	G
"	I	" bisection	"	"	11 56 58		
"	I	" last cont.	"	"	12 2 12		
22	I	Ecl. reapp.	"	140	9 54 12.2	9 54 3.6	C
June 12	II	Tr. ing. first cont.	"	"	11 25 17	11 26	T
"	II	" bisection	"	"	11 26 46		
"	II	" last cont.	"	"	11 28 46		
"	I	Occ. disap. first cont.	"	"	12 15 8	12 21	T
"	I	" bisection	"	"	12 16 8		
"	I	" last cont.	"	"	12 17 8		
"	III	Tr. eg. first cont.	"	"	12 22 52	12 28	T
"	III	" bisection	"	"	12 25 7		
"	III	" last cont.	"	"	12 27 21		
July 6	I	Tr. ing. first cont.	"	310	9 40 42	9 40	C
"	I	" last cont.	"	"	9 43 42		

Notes.

- (a) The planet was ill defined.
- (b) Dichotomized at about 3^m 20^s before the recorded time.
- (c) Tremulous.
- (d) Satellite bright on dark north polar belt; sky very hazy, and definition bad.
- (e) Light clouds; limb very tremulous.
- (f) Definition not very good; the satellite attained its full brightness about 3^m after the recorded times.
- (g) The satellite attained its full brightness about 3^m after the recorded times.
- (h) Very tremulous at times.
- (i) Doubtful; cloudy.
- (k) Tremulous; definition very variable.
- (l) Definition very bad, limb blurred, and sky cloudy.
- (m) Very cloudy.

The initials W C, L, C, A D, M, T, J, and G, are those of Mr. Christie, Mr. Lynn, Mr. Criswick, Mr. Downing, Mr. Maunder, Mr. Thackeray, Mr. Jenkins, and Mr. Graham.

Royal Observatory, Greenwich,
1875, January 14.

Note on the Double Stars, Σ 1156 and Σ 1163.

By S. W. Burnham, Esq.

Baron Dembowski has called attention (*Astr. Nach.* 1979) to an error of 2^m 11^s in the Right Ascension of Σ 1163, as given in *Mensuræ Micrometricæ*. This correction brings it very near the place of Σ 1156, as the latter in the same catalogue is 2^m 3^s preceding, and 3' north. Struve's measures are as follow:—

Σ 1156	P = 158 ^o 5	D = 18 ["] 64	Mags. 8.0, 10.2
Σ 1163	P = 160.7	D = 18.35	Mags. 7.7, 9.7

Suspecting from the similarity of these results that the two pairs were the same, I carefully examined the vicinity, and found that they were really identical, there being no star in the place of Σ 1163. The principal star of the double is Weisse VII. 1346, agreeing exactly with the place of Σ 1156 in *Positiones Mediæ*. In many instances double stars are entered twice in the several lists of Sir John Herschel, but I am not aware of any other case where this has been done in the great Dorpat Catalogue.

Chicago, 1875, Nov. 30.